

REMARKS

Claims 1-11 are all the claims pending in the application, prior to the present Amendment.

Claims 2, 5 and 9-11 have been rejected under 35 U.S.C. 112, second paragraph, as being indefinite.

The Examiner sets forth a number of reasons for this rejection. Applicants discuss these reasons below.

The Examiner states that the scope of claims 2 and 9 is vague because it is not clear exactly what method step of production is being claimed therein and how the hardness of the forging die material further limits the method step of the forging die production.

Applicant disagrees with this rejection.

The method of claim 2 further limits the method of claim 1 because claim 2 requires that the material that is being cut has a specified hardness. Claim 1 does not specify the hardness. Thus, claim 1 can be practiced by cutting any forging die material, whereas claim 2 requires that a specified forging die material be cut. Thus, claim 2 is narrower than claim 1. One can infringe claim 1 without infringing claim 2. Therefore, claim 2 further limits claim 1.

Applicant notes that in order to further clarify claims 2 and 9, applicant has amended the term “a hardness of HRC” to “a Rockwell C hardness of”.

The Examiner states that in claim 5, it is unclear what “a workpiece” refers to. The Examiner asks whether the claimed corner recess is formed in the forging die material of claim 1?

In response, applicant has amended claim 5 by deleting reference to a workpiece, and by referring to the forging die material.

The Examiner states that it is not understood how the compound curvature of the corner recess further limits the claimed production method.

The Examiner asks “[e]xactly what method step is being claimed that produces such compound curvature in the corner recess?

Applicant disagrees with this rejection.

Claim 5 requires that the cutting produces a compound curvature. Claim 1 does not require a compound curvature. Therefore, claim 5 further limits claim 1.

With respect to what method step is being claimed that produces the compound curvature, there is no requirement that a specific step be set forth in the claims. The specification contains a detailed disclosure of various methods for producing different compound curvatures.

Applicant notes that the compound curvature in corner recess is produced through “a cutting step” in claim 1, such as by “a profile cutting” in claim 4 or claim 11. See page 18, line 24 to page 28, line 27, particularly, page 22, line 7 to page 27, line 3 of the present specification.

Applicant has amended claim 5 to state that the compound curvature in a corner recess is produced through the cutting step.

In view of the above, applicant requests withdrawal of this rejection.

Claims 1, 5, 6 and 8 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 3,863,525 to Cale.

Applicant has canceled claims 6 and 8, thus leaving claims 1 and 5 as being subject to this rejection.

Applicant submits that Cale does not disclose or render obvious the presently claimed invention and, accordingly, requests withdrawal of this rejection.

The Examiner argues that the cited structural limitation “a ball end mill having a surface which has undergone a hardening treatment and in which a forging die material is cut under conditions where a length of tool extension L (mm), radius R (mm) of a cutting edge of the ball end mill, spindle speed A (rpm) and feed rate B (mm/min) satisfy $(B/A)^2 \times (L/(2 \times R)) = 0.01$ to 0.05” is considered by the Examiner to not to define any method step and accordingly cannot serve to distinguish over Cale.

The Examiner further states that it has been held that to be entitled to weight in method claims, the recited structure limitations therein must affect the method in a manipulative sense, and not to amount to the mere claiming of a use of a particular structure.

Applicant submits that the Examiner has not correctly analyzed the method of claim 1.

In particular, claim 1 is not reciting a structural limitation, but is reciting a cutting limitation that depends on the spindle speed and feed rate. Table 1 of the present specification shows that a cutting tool having a particular radius and length of extension can be employed in accordance with the present invention as in Examples 1 and 2, or can be employed as in Comparative Examples 1, 2 and 3 in a manner that does not satisfy the present invention because the spindle speed and feed rate do not result in a method which satisfies the formula of claim 1. This shows that claim 1 is requiring specific manipulative method steps. Cale does not disclose or suggest these steps.

Table 1 also shows that the different manipulative steps produce different results using the exact same cutting tool. This again shows that the present claims are defining method steps and not structural limitations.

Applicant has amended claim 1 to clarify the feature that claim 1 recites a cutting recitation that depends on the spindle speed and feed rate by reciting that the ball end mill is

controlled so that the length of tool extension L (mm), the radius R (mm) of a cutting edge of the ball end mill, the spindle speed A (rpm) and the feed rate B (mm/min) satisfy the equation set forth in claim 1. Cale does not disclose or suggest a method having the cutting step set forth in claim 1.

In view of the above, applicant submits that Cale does not disclose or render obvious the presently claimed invention and, accordingly, requests withdrawal of this rejection.

Claims 2, 7 and 9 have been rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 3,863,525 to Cale.

In addition, claims 3 and 10 have been rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 3,863,525 to Cale in view of U.S. Patent No. 5,378,091 to Nakamura.

Claims 2, 3, 7, 9 and 10 each depend from claim 1. Accordingly, applicant submits that these claims are patentable over Cale for the same reasons as discussed above. Further, Nakamura does not supply the deficiencies of Cale.

In view of the above, applicant submits that Cale and Nakamura do not disclose or render obvious the subject matter of claims 2, 3, 7, 9 and 10 and, accordingly, requests withdrawal of this rejection.

Claims 4 and 11 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Cale U.S. Patent No. 3,863,525 to Cale in view of U.S. Patent No. 3,712,157 to Kratz et al.

Applicant submits that Cale and Kratz et al do not disclose or render obvious the subject matter of claims 4 and 11 and, accordingly, requests withdrawal of this rejection.

Claims 4 and 11 each depend from claim 1. Accordingly, applicant submits that these claims are patentable over Cale for the same reasons as discussed above in connection with claim 1. Kratz et al do not supply the deficiencies of Cale.

Further, the production method disclosed in Cale employs two types of milling cutters, namely, a first rotating end-type milling cutter, and a second downwardly tapered end-type milling cutter which is far thinner than the first rotating end-type milling cutter. See claim 1 of Cale. The horizontal groove (3) in the embodiment disclosed in Cale is formed by using the first rotating end-type milling cutter which has the maximum diameter of which is the same as the diameter of the die cavity that is to be formed. See column 1, lines 61-65; column 2, lines 4-7; and figures 1-3. The second downwardly tapered end-type milling cutter is used solely for the purpose of forming, in one side of the horizontal groove (3) near one end thereof, the horizontally curved end wall (7) of the horizontal groove (3) and an arcuate shoulder (6). See claim 1; column 2, lines 20-42; and figures 4-6.

In this way, Cale forms most of the shape of the forging die in a single step by using the first rotating end-type milling cutter. However, Cale fails to disclose or suggest forming a forging die by cutting a forging die material in no less than three steps with the degree of cutting changed in each step as recited in claims 4 and 11 of the present application.

It should be noted that Cale does not disclose individual conditions of spindle speeds and feed rates of the first rotating end-type milling cutter and the second downwardly tapered end-type milling cutter. Therefore, applicant submits that in the case of the invention in Cale, such conditions have to be determined on a trial and error basis on the spindle speed and feed rate, and the length of tool extension could not have provided the optimal conditions, and therefore the

Cale invention is similar to the conventional arts. See page 4, line 27 to page 5, line 3 of the present specification.

Still further, the invention in Kratz et al relates to high speed steel coinage dies.

However, Kratz et al fail to disclose or suggest forming a forging die by cutting a forging die material in no less than three steps with the degree of cutting changed in each step as recited in claims 4 and 11 of the present application.

In contrast to Cale and Kratz et al, according to the invention recited in claims 4 and 11, a forging die having a desired shape is produced by a cutting that is performed in at least three steps so that pick feeds in respective steps are in proportions of (1.2 to 2):(0.2 to 0.5):(0.03 to 0.05).

By performing such a cutting work, it is possible to prevent the surface finish conditions after the step of cutting the material from becoming uneven, and dimensional accuracy in terms of die design can be improved. See page 19, lines 3-16 of the present specification.

In fact, an example of the present invention produced through the three-step cutting is superior to a Comparative Example produced through two-step cutting in terms of the surface finish conditions after the material underwent cutting. See page 29, lines 12-13 and Table 2 of the present specification.

In view of the above, applicant submits that Cale and Kratz et al do not disclose or render obvious the subject matter of claims 4 and 11 and, accordingly, requests withdrawal of this rejection.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the

Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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